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Traditional to Intelligent Libraries: Exploring the Role of Artificial Intelligence in Futuristic Development in School Libraries

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Abstract

This article explores the integration of artificial intelligence (AI) tools in school libraries, particularly focusing on their potential to enhance library services and operations. AI can streamline routine administrative tasks, improve information retrieval, and provide personalised learning experiences for students. The study examines AI knowledge and awareness among school librarians, revealing that although many are familiar with AI technologies, there is a significant need for further education and training. Key benefits of AI identified include improved search capabilities, support for information literacy, and the introduction of innovative technologies such as virtual reality (VR) and augmented reality (AR) into learning environments. However, challenges such as inadequate training, ethical concerns, privacy, and data security are notable barriers to widespread AI adoption. The article highlights the importance of addressing these challenges through continuous evaluation, infrastructural development, and hands-on training to ensure AI tools are used effectively and safely. Ultimately, the study concludes that AI has the potential to transform school libraries significantly, provided the necessary support systems are in place to maximise its benefits.

Keywords: Artificial Intelligence (AI), School Libraries, Library Automation, Information Retrieval, AI Tools, Digital Literacy, Personalised Learning, Ethical Considerations.

Introduction

All facets of society are increasingly incorporating artificial intelligence, often without conscious awareness. Artificial Intelligence is becoming an indispensable aspect of daily life, ranging from government-installed public welfare gadgets to personal mobile phones and office computer programs. Artificial Intelligence is the ability of computer programming to perceive, think and act accordingly as compared to human intelligence. Jesubukade Emmanuel Ajakaye of the University of Ibadan, Nigeria, stated, “Human cognitive characteristics are appropriated, modelled, and integrated as algorithms in a manner that computers understand and can process to give an output or result” (Ajakaye, 2023). To our understanding, Intelligence is the ability to think, learn facts and skills, and apply them (Omame, 2020) at the time of completing any task, regardless of task complexity. In contrast, Artificial is created or manufactured by humans rather than existing naturally, particularly when it is a replica of something natural. Artificial Intelligence is one aspect of the development of computer engineering. Examples of Artificial intelligence in computers are “speech recognition, natural language processing, self-driving or autonomous cars, machine learning, deep learning and robotics” (Omane, 2020).

Information is becoming the basis of society's development, curated, preserved, and disseminated through libraries of government institutions, private libraries, and special libraries. AI can be an ideal tool for 21st-century libraries, as it can effectively understand users' needs, match cognitive queries to the library's available collection, and provide faster service than traditional LIS professionals. The library employs a collection of technologies that incorporate AI features, capable of understanding, behaving, learning, and executing complex administrative tasks. The use of AI tools in the library does not require LIS professionals to have technical programming knowledge to perform day-to-day responsibilities.

Developing reading habits among staff and students is a primary responsibility of the school library. School librarians can achieve this by adopting a variety of reading activities. With the increasing use of AI tools in academic libraries for tasks like housekeeping operations and routine transactions, school libraries are also starting to incorporate AI into their daily functions. Library automation, digitisation, mobile applications, and web tools for library services are increasingly prevalent in school libraries. School librarians are improving their services and skills through the application of AI, enabling them to fulfil their assigned responsibilities more effectively. This article analyses the knowledge of LIS professionals in school libraries regarding the application of AI tools and examines the issues and challenges encountered in their use. This study is mainly limited to school libraries. Here, the author seeks to explore the application of various AI tools and their impact on the school library.

Artificial Intelligence: History and Application

Artificial intelligence's (AI) origins and evolution may be traced to the mid-1900s. When John McCarthy first used the phrase at the Dartmouth Conference in 1956 (Wikipedia, 2024), artificial intelligence became a recognised subject of study. Symbolic reasoning and problem solving were the main topics of early AI research. AI systems that mimicked human speech, such as ELIZA, were developed during the 1960s. Early applications in industries such as engineering and medicine were made possible by the advent of "expert systems" in the 1970s, which applied reasoning to specific disciplines.

Thanks to developments in machine learning and neural networks, there was a boom in AI research in the 1980s. Nevertheless, development was delayed by insufficient processing capacity. As computing technology advanced in the 1990s, more useful AI applications emerged. One example of this was IBM's Deep Blue, which in 1997 defeated chess champion Garry Kasparov. Advances in AI technology, algorithms, and data processing over the 2000s and 2010s gave rise to technologies like voice assistants, self-driving cars, and AI-powered data analytics.

Artificial Intelligence has revolutionised library operations. AI was primarily utilised in the early 2000s to catalogue and automate routine processes such as book check-ins and check-outs. By the 2010s, libraries had started implementing AI technologies for automated cleaning, better user search experiences through natural language processing, and tailored recommendations. To improve library services and user engagement in the digital era, artificial intelligence (AI) is becoming a key component of chatbots, mobile apps, digitalisation initiatives, and library management systems.

Objectives

With the following objectives, the authors of the article have taken on this project. Objectives are

1. To examine the role of AI tools in enhancing library services and operations in school libraries.
2. To explore how AI can support personalised learning and improve student engagement with library resources.

3. To analyse the potential of AI for automating routine tasks, allowing library professionals to focus on more strategic activities.
4. To identify challenges and opportunities in integrating AI technologies into school library systems.
5. To highlight future trends in AI adoption for improving library services and user experiences in educational settings.

Literature Review

In their research article entitled "Artificial Intelligence in Libraries", Omame and Alex-Nmecha (2020) have suggested reinventing library services by examining existing practices and emphasising AI applications in libraries. They have agreed to improve library services by applying AI. The library housekeeping operation, such as technical, reference, circulation, resource management, and information retrieval/dissemination, will be highly beneficial to libraries. Castellanos-Nieves and García-Forte (2023) found that by carefully evaluating the energy efficiency of computing operations, AutoML can be made more sustainable. They identified potential solutions to the problem based on the measurements in their article "Improving Automated Machine-Learning Systems through Green AI", which may apply to similar issues as well. Subaveerapandiya et al. (2023) in their study found the use of AI across different library fields, such as reference, circulation of library materials, security and surveillance, character recognition and document preservation, research data management, language translation, and others. However, many of the respondents expressed concern about work competency, librarian employment, cybersecurity and network management, data quality control, data curation, and database management. The study concluded that 44.1% of the LIS fraternity agreed on the effectiveness of AI in libraries. According to Massis (2018), although the inclusion of new technology is taken seriously, AI offers numerous potential benefits across a wide range of library services, many of which are still in the early stages of investigation, consideration, and piloting. Again et.al. (2024) conducted an application review of AI in Nigerian academic libraries. They concluded that Artificial intelligence is increasingly integrated into Nigerian academic libraries, which could fundamentally alter how these institutions operate and serve their users. However, for implementation to be successful, librarians' preparedness is essential. This study reviews the literature on Nigerian university libraries' current AI integration efforts and their preparedness to employ these technologies.

Scope of the Study

This study examines the integration of artificial intelligence (AI) tools in school libraries, focusing on how these technologies can improve user experiences, augment library services, and expedite daily operations. The authors have considered Kendriya Vidyalaya Sangathan's libraries under the purview of this study, which is recognised as the best school educational set-up for quality education. In the study, only librarians at KVS were given a questionnaire to complete.

Methodology

For this study, the author developed an open-ended, structured questionnaire using Google Forms. The form is divided into two sections: section one covers the responder's demographic information, and section two addresses the school LIS professional's awareness and familiarity with Artificial Intelligence (AI) Tools. Section two is the central body of the study, where respondents submit their responses. The questionnaire is circulated among the school librarians of KVS by sharing a Google link via their email

addresses, mobile numbers, and the dedicated WhatsApp group. The collected responses are entered and analysed in MS Excel, and the interpretation and findings are submitted. Two Hundred Eighty-Four responses were received to the questionnaire distributed to school librarians, though it was circulated to more than 664 librarians across different school set-ups. In addition to the personal email and mobile number, the study included some WhatsApp groups, each with a good number of LIS members. The covered LIS WhatsApp groups are "Librarian ISC Bhubaneswar 2023-24 "(51 members), "KV Pustakaalaya" (258 members), "LIS admin group" (244 members), "Eg 4.0 workshop" (50 members), and "Librarian KVS, BBSR" (61 members). The data is presented in tables and pie charts for better visibility, understanding, and presentation.

Data Analysis and Interpretation

Familiarity Level Distribution

Table 1 illustrates significant variation in AI awareness among respondents, with 58.8% reporting a moderate level of awareness. 27.51% of respondents reported being very familiar with and understanding the concept of AI. 13.7% said they are entirely unfamiliar with the terminology and subject matter associated with their daily lives.

Table 1 Familiarity Level Distribution

Familiarity Level	Counts	% of Total	Cumulative %
Somewhat familiar	167	58.8%	58.8%
Not familiar at all	39	13.7%	72.5%
Very familiar	78	27.5%	100.0%
Total	284	100.0%	---

[AI-Enabled Library Functions

AI is developed to perform critical and challenging work by utilising human-level competencies, i.e., understanding, analysing, thinking, learning, behaving, and acting. By applying AI, people can save time, achieve better results in administrative work, and boost creativity. AI is primarily used for library housekeeping operations; the study analyses its potential in school libraries. The diverse services of AI are sought, as highlighted in Table 2, with 13.4% of respondents apprehending that the application of AI in libraries would improve information retrieval and search capabilities. Apart from this, the majority of respondents consent that AI can be employed in the library for personalised recommendations for students, Automation of administrative tasks, Enhanced data analytics for decision-making, Support for information literacy and research skills, and Innovative learning experiences through technologies like virtual reality (VR) and augmented reality (AR). The diversified data is an outcome of 38 responses with a cumulative percentage of 13.4%. The table is reduced to only the highest response because the table is lengthy and contains multiple responses from respondents.

Table 2 AI-Enabled Library Functions

Potential benefits that AI tools offer	Counts	% of Total	Cumulative %
Improved information retrieval and search capabilities, Personalised recommendations for students, Automation of administrative tasks, Enhanced data analytics for decision-making, Support for information literacy and research skills, Innovative learning experiences through technologies like virtual reality (VR) and augmented reality (AR)	38	13.4%	13.4%

Application of AI in School Library

Table 3 clearly states that the emergence of AI in school libraries is still quite far off. The majority, i.e., 54.39% of school librarians (155), have found no scope for using AI to enhance library services for housekeeping operations and service delivery. However, a minimal percentage of librarians, probably with IT knowledge, are effectively service-delivery-oriented or real innovators using AI, with 11.93% at least seeking assistance with different aims and objectives. Actually, only 34% are using an AI-delivered online platform to improve their library services. The study found that ChatGPT/Chatbots are mostly dominating the field. Apart from ChatGPT, ASK AI APPs, BASINI, and AUTOMATION S/W, other commonly used AI tools in school libraries include. In the study, 95 participants did not share their AI application or experience.

Table 3: Application of AI in School Library

Use of AI tools in a school library	Counts	Total %	Cumulative %
Not Yet	155	54.39%	54.39%
Intelligent Search Systems, Chatbots and Virtual Assistants	13	4.56%	58.95%
Yes, ASK AI APP	6	2.11%	61.06%
Yes, Bhasini and others	6	2.11%	63.17%
In eG 4.0, software runs in the cloud.	5	1.75%	64.92%
Improved information retrieval and search capabilities	4	1.4%	66.32%
No Response	95	33.5%	100%
Total	284	100.0%	---

Boosting Critical Thinking through AI-based Library Services

This study has gathered a positive response, suggesting that integrating AI-based library services is beneficial. By adopting and practising AI-based technology, there is scope to assist students in conducting more effective and efficient subject-specific projects (13.0%). AI facilitates collaborative learning opportunities and a wide range of SDI educational resources by 14.8% and 16.9% respectively. Group study and interaction would not only help improve educational performance but also enhance dynamic areas of analysis and innovative study. At the same time, it also strongly believes in enhancing students' 21st-century skills, such as digital literacy (6.3%). Along with this, many such areas are witnessing improvements in library services and educator performance. The practice highlights the library's diminishing role in society. It is strongly recommended to maximise the use of AI to deliver effective, efficient library services and to gain the strong recognition of LIS professionals.

Concerns and Challenges in the Application of AI

Diversified areas of concern and challenges faced by school library professionals are encountered, which are recorded and illustrated through Image 1, as reflected below. Quantitative analysis of the data indicates that training in AI is a significant challenge for LIS professionals, with the highest percentage at 20.4%. Combining data privacy, training and ethical awareness is the second most challenging, with 14.4%. At the third position, Equitable access with 9.5% has remained a concern over the use and patronage of AI tools. Analysing the respondent responses in depth, there are more such areas, with responses ranging from 0.7% to 7.7% (Privacy+Biasness+Access+Training+Ethics+Equitable access, etc.).

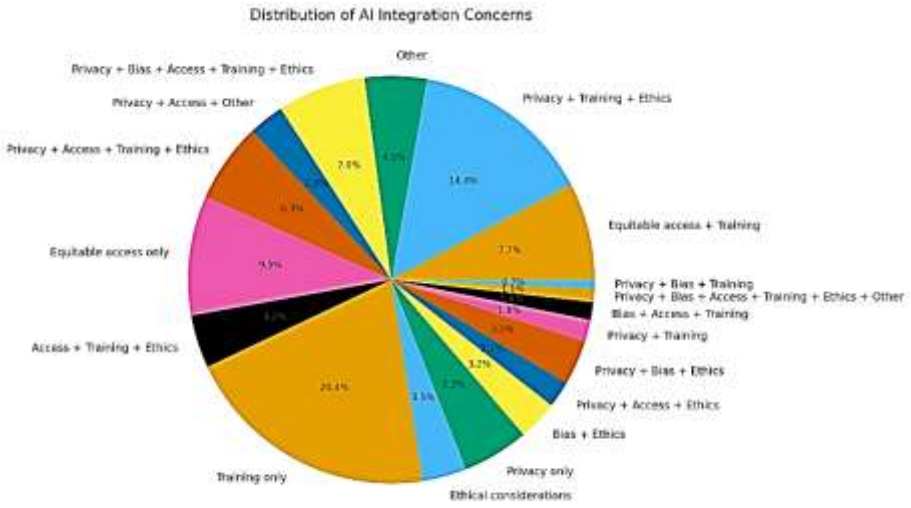

Image 1
Source: Author Creation

AI: Enhancing Teacher-Librarian Collaboration

To achieve the set target for every Vidyalaya, the teachers may not be able to handle all circumstances. Librarians in the school extend their support to the teacher's fraternity in achieving their learning outcomes. Students' learning outcomes and competencies can be achieved through the provision of add-on resources, tests, project assignments, demonstrations, debates, quizzes, and other activities. To organise all these activities, the librarian can help teachers make it easier and more comfortable. The study seeks

to explore the possibility of collaboration between teachers and librarians using AI tools. The result is outstanding, as the pie chart below shows that 70.1% (199) of teachers and librarians agree that collaborating is possible when using AI tools. 23.6% (67) of librarians are unsure about collaboration, whereas only 6.3% (18) felt that collaboration is not possible by the application of AI.

Table 4: Distribution of Teacher-Librarian Collaboration

Response	Counts	% of Total	Cumulative %
Yes	199	70.1%	70.1%
Maybe	67	23.6%	93.7%
No	18	6.3%	100.0%
Total	284	100.0%	---

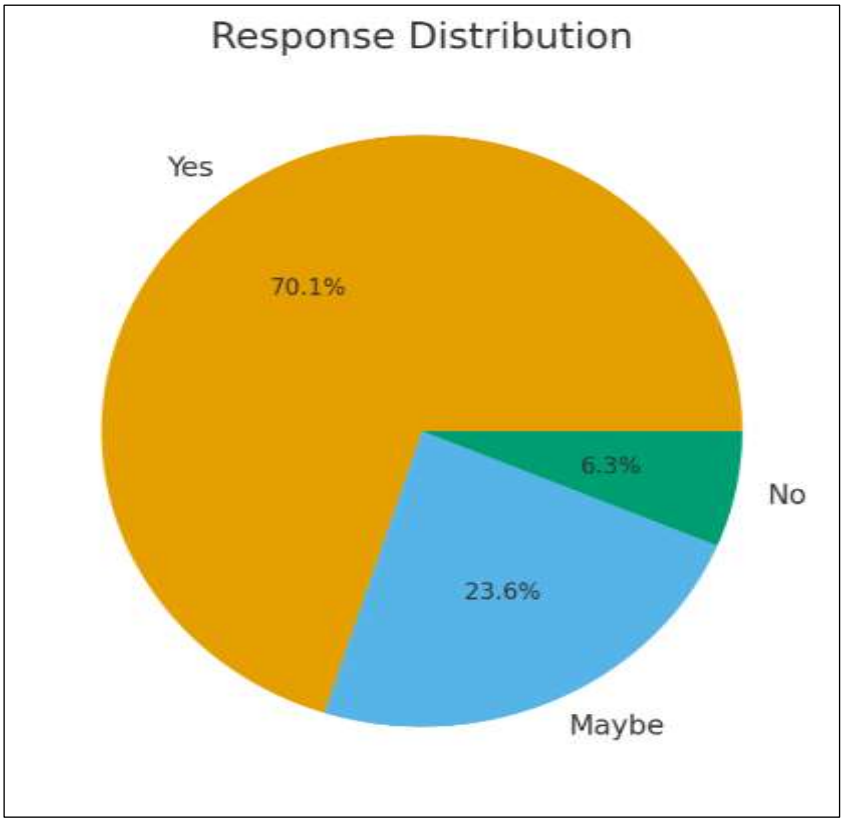

Image 2: Teachers' Librarian Collaboration
Source: Author's Creation

Addressing Ethical Considerations

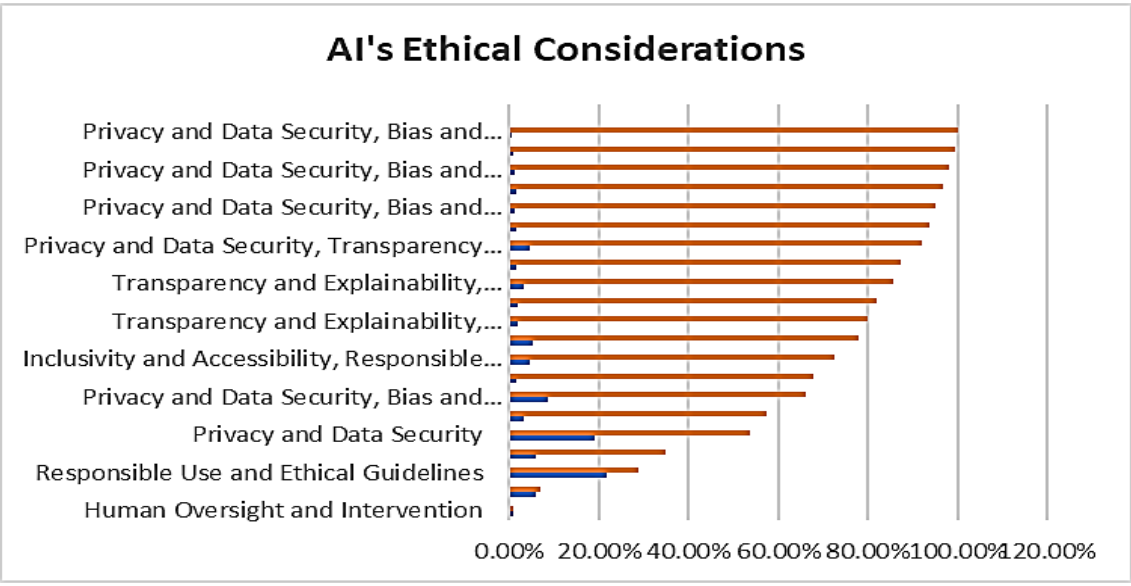

Image-3
Source: Authors' Creation

Familiarising oneself with new and advanced tools can pose significant challenges for people across all ages. Data, whether private or public, has a significant role in development and growth. Many such issues are observed, including official, personal, or financial losses resulting from third-party agreements and access to personal systems and devices. Hence, whenever entering the world of technology and gateways, many such unethical permissions should be avoided while registering with the tools and websites. In counting, many can be listed as faced by humans or employees personally. In this study, at least 21 primary ethical considerations should be observed when using AI. A higher percentage of ethical consideration is responsible use and ethical guidelines, with 21.8%. This analysis states that awareness of AI tool use must be raised to ensure terms and conditions are provided. It is always recommended that, before signing up with any such AI platform, everyone follow the guidelines and documentation for fair use. After responsible use and ethical guidelines, respondents rate inclusivity and Accessibility with 19.0%. Somewhere, they believe it is not meant for every profession or every state of being human. It is also not accessible in a fair manner, as respondents believe. Some other major ethical considerations include Privacy and Data Security, Bias and Fairness, Transparency and Explainability, and Human Oversight and Intervention.

Factors Responsible for the Implementation of AI Tools

Combined List of Factors	Counts	% of Total	Cumulative %
Infrastructure and Technical Support	18	6.3%	6.3%
Adequate Training on AI	39	13.7%	20.1%
Ongoing Support and Professional Learning Communities	23	8.1%	28.2%

Combined List of Factors	Counts	% of Total	Cumulative %
Clear Objectives and Alignment with Educational Goals	26	9.2%	37.3%
Continuous Evaluation and Feedback	12	4.2%	41.5%
Resource Availability and Accessibility	15	5.3%	46.8%
Adequate Training on AI, Clear Objectives and Alignment with Educational Goals, Infrastructure and Technical Support, Collaboration and Stakeholder Engagement, Resource Availability and Accessibility, Continuous Evaluation and Feedback, Ongoing Support and Professional Learning Communities	47	16.5%	63.4%
Adequate Training on AI, Collaboration and Stakeholder Engagement, Resource Availability and Accessibility	5	1.8%	65.1%
Adequate Training on AI, Clear Objectives and Alignment with Educational Goals, Resource Availability and Accessibility, Ongoing Support and Professional Learning Communities	5	1.8%	66.9%
Adequate Training on AI, Infrastructure and Technical Support, Collaboration and Stakeholder Engagement, Continuous Evaluation and Feedback	5	1.8%	68.7%
Clear Objectives and Alignment with Educational Goals, Resource Availability and Accessibility	6	2.1%	70.8%
Adequate Training on AI, Infrastructure and Technical Support, Ongoing Support and Professional Learning Communities	6	2.1%	72.9%
Adequate Training on AI, Clear Objectives and Alignment with Educational Goals, Infrastructure and Technical Support, Collaboration and Stakeholder Engagement, Continuous Evaluation and Feedback	6	2.1%	75.0%
Adequate Training on AI, Infrastructure and Technical Support	9	3.2%	78.2%
Adequate Training on AI, Clear Objectives and Alignment with Educational Goals, Infrastructure and Technical Support, Continuous Evaluation and Feedback	5	1.8%	79.9%

Combined List of Factors	Counts	% of Total	Cumulative %
Adequate Training on AI, Clear Objectives and Alignment with Educational Goals, Resource Availability and Accessibility	5	1.8%	81.7%
Infrastructure and Technical Support, Collaboration and Stakeholder Engagement, Resource Availability and Accessibility	10	3.5%	85.2%
Adequate Training on AI, Clear Objectives and Alignment with Educational Goals, Infrastructure and Technical Support, Resource Availability and Accessibility, Ongoing Support and Professional Learning Communities	8	2.8%	88.0%
Adequate Training on AI, Clear Objectives and Alignment with Educational Goals, Continuous Evaluation and Feedback	4	1.4%	89.4%
Infrastructure and Technical Support, Collaboration and Stakeholder Engagement	5	1.8%	91.2%
Adequate Training on AI, Clear Objectives and Alignment with Educational Goals, Infrastructure and Technical Support, Collaboration and Stakeholder Engagement	5	1.8%	93.0%
Collaboration and Stakeholder Engagement, Resource Availability and Accessibility, Continuous Evaluation and Feedback	5	1.8%	94.7%
Adequate Training on AI, Clear Objectives and Alignment with Educational Goals, Infrastructure and Technical Support	5	1.8%	96.5%
Infrastructure and Technical Support, Resource Availability and Accessibility, Ongoing Support and Professional Learning Communities	4	1.4%	97.9%
Clear Objectives and Alignment with Educational Goals, Infrastructure and Technical Support, Continuous Evaluation and Feedback	4	1.4%	99.3%
Clear Objectives and Alignment with Educational Goals, Collaboration and Stakeholder Engagement, Resource Availability and Accessibility, Continuous Evaluation and Feedback	2	0.7%	100.0%

Combined List of Factors	Counts	% of Total	Cumulative %
Total	284	100.0%	---

Numerous factors are responsible for the effective implementation of AI and its outcome. According to the Google Form responses, multiple options are supposed to be selected at the respondent level. Different factors are combined to report by analysing the combined response 47 responses received for "Adequate Training on AI, Clear Objectives and Alignment with Educational Goals, Infrastructure and Technical Support, Collaboration and Stakeholder Engagement, Resource Availability and Accessibility, Continuous Evaluation and Feedback, Ongoing Support and Professional Learning Communities" which is more in number with 16.5% with cumulative response of 63.4%. After the above combined response, "Adequate Training on AI" is taken as the second most important issue in implementing AI in school libraries, with 39 responses, which is 13.7% (Cumulative percentage is 20.1%), followed by "Clear Objectives and Alignment with Educational Goals" with 9.2% with a cumulative percentage of 37.3%. Other combined responses were received as well, but they are very few in number and percentage and are considered reasonable.

Workshop and Training Programme on AI

New technologies and advancements require clear training for their effective implementation and better outcomes. In this study, training on AI tools for better dissemination of library services and LIS professional needs analysis, rather than AI training and workshops, is expected. It was found that 213 professionals, with 75.0% showing keen interest, are willing to facilitate workshops or training on different AI-based applications for the library. 23.9% are somewhat acquainted but still require little support in using AI tools. Only a marginal percentage, i.e., 1.1% (3 respondents only), shows at most competency in handling AI tools. From the analysis, it can be concluded that, except for a few respondents, the majority of LIS professionals are not at all confident about the types of AI tools and their applications in library services. Hence, it is required to provide training to the majority of school Library professionals on how and what kinds of AI can be integrated into library services.

Training Option	Counts	% of Total	Cumulative %
Very interested	213	75.0%	75.0%
Somewhat interested	68	23.9%	98.9%
Not interested	3	1.1%	100.0%
Total	284	100.0%	---

(Image-6)
Source: Author's Creation

Discussion and Interpretation

Suggestive measures for the application of AI in school libraries

The feedback gathered from the questionnaire on additional comments and insights regarding AI tools in school libraries underscores several important considerations for the successful integration of AI into educational spaces. A recurring theme is the need for continuous evaluation and feedback to monitor the impact and effectiveness of AI tools on students' learning experiences. Concerns were raised about the potential for AI tools to diminish students' logical thinking skills, suggesting that it is crucial to develop strategies to counterbalance this and foster critical thinking alongside technological advancements.

Many respondents emphasised the importance of technical support and hands-on training to ensure that AI tools are used safely and effectively. Moreover, operational efficiency was a key point, with AI being viewed as a powerful tool to optimise library processes, from digital asset management to research data management and collection analysis, ultimately reducing operational costs. Librarians noted that adopting AI could significantly streamline data processing and routine tasks, freeing up time for more impactful, user-focused services.

However, concerns about infrastructure were also evident, with many calling for adequate computer systems and reliable internet connectivity as prerequisites for successful AI implementation. Additionally, respondents highlighted the need for AI literacy among librarians, ensuring that all staff have the necessary knowledge and skills to use AI tools effectively. Overall, while the potential of AI to transform school libraries is widely recognised, respondents believe that infrastructure, training, and thoughtful implementation are essential to safely and efficiently realise its full benefits.

Findings of the Study

Based on the responses and data collected, several key insights have emerged regarding the use and potential of AI tools in school libraries. A significant proportion of school librarians are aware of AI technologies, with about 27.5% being very familiar and over 58.8% somewhat familiar with AI tools. However, a notable 13.7% of librarians lack familiarity, indicating a need for more education and awareness initiatives.

Respondents overwhelmingly recognise the potential benefits of AI for enhancing library services. The majority (13.4%) believe that AI can "improve information retrieval and search capabilities, Personalised recommendations for students, Automation of administrative tasks, Enhanced data analytics for decision-making, Support for information literacy and research skills, Innovative learning experiences through technologies like virtual reality (VR) and augmented reality (AR)".

Despite these positive perceptions, there are notable challenges to implementing AI in school libraries. The lack of adequate training and support was cited as the top concern by 20.4% of respondents. At 14.4%, combining data privacy, training, and ethical awareness is the second most challenging. Equitable access has remained a concern regarding the use and patronage of AI products, ranking third at 9.5%. There are additional similar categories, with replies ranging from 0.7% to 7.7%, according to a thorough analysis of the respondent responses (Privacy+Biasness+Access+Training+Ethics+Equitable access, etc.).

Many librarians emphasised the need for continuous evaluation and feedback mechanisms to ensure that AI tools do not diminish students' logical thinking abilities, a concern raised by some participants. Moreover, the need for adequate infrastructure, including reliable computer systems and internet connectivity, was frequently mentioned as a prerequisite for successfully integrating AI tools.

Conclusion

The study reveals that while AI tools offer great potential to enhance school library functionality by improving resource accessibility, automating routine tasks, and introducing innovative learning opportunities, several challenges remain. The most significant barriers include inadequate training, concerns about privacy and data security, and ethical issues. To fully realise the benefits of AI in school libraries, it is essential to provide proper training for librarians, ensure equitable access for all students, and address infrastructural needs. Continuous evaluation and feedback mechanisms will also be critical in monitoring AI's impact and ensuring it supports rather than undermines critical thinking and learning outcomes. With thoughtful implementation, AI can play a transformative role in shaping the future of school libraries.

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